

Low-power Cross-Correlator ASIC, Phase II

Completed Technology Project (2013 - 2016)



Project Introduction

The NASA's PATH mission includes the GeoSTAR satellite that carries aboard a microwave sounder employing an array of 375 microwave antennas with corresponding receivers. Each receiver is tuned to the 180GHz frequency, while the intermediate frequency (IF) reaches 500MHz. The IF signal is quantized at 1GHz with 2-bit accuracy. The resulting data rate is 700Gb/s. This data has to be pre-processed aboard the satellite before it can be transmitted to Earth for further processing. One of the steps of such data processing is cross-correlation. For a space borne instrument, power dissipation and radiation hardness are among the most important requirements. Pacific Microchip Corp. is designing an ASIC that includes a cross-correlation unit with interfaces for the GeoSTAR's receivers. The ASIC will have greatly reduced power consumption compared to that of the FPGA-based or classic ASIC-based implementations. This ASIC must be designed and integrated with already existing system components of the GeoSTAR instrument. The ASIC includes cross-correlation cells based on novel architecture. The deep submicron SOI CMOS technology selected for the ASIC's fabrication will increase its tolerance to the total ionizing dose (TID) and reduce the probability of radiation-induced latch-up. The design of the ASIC will follow design for testability (DFT) methods, which will simplify characterization and testing of the fabricated ASIC, reduce risk and lower the cost of the product.

Primary U.S. Work Locations and Key Partners

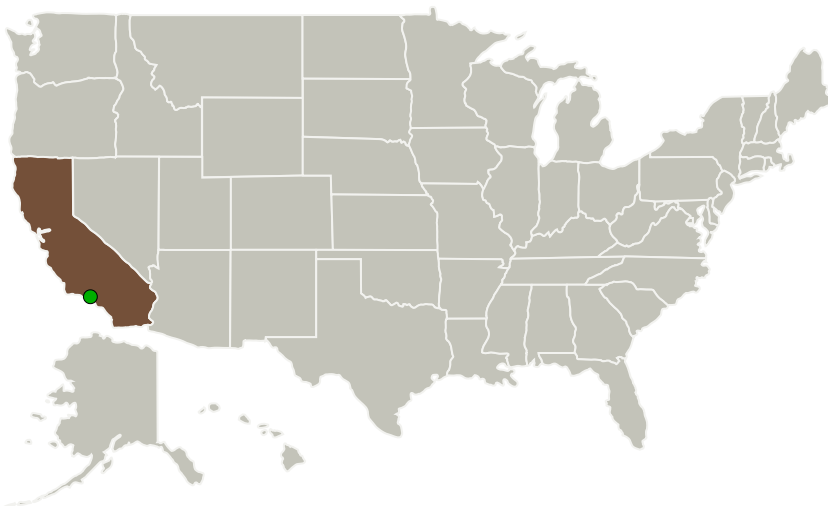
Low-power Cross-Correlator
ASIC, Phase II

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Organizations Performing Work	Role	Type	Location
Pacific Microchip Corporation	Lead Organization	Industry	Culver City, California
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California

Images



Briefing Chart

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(<https://techport.nasa.gov/image/131444>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Pacific Microchip Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Denis Zelenin

Co-Investigator:

Denis Zelenin

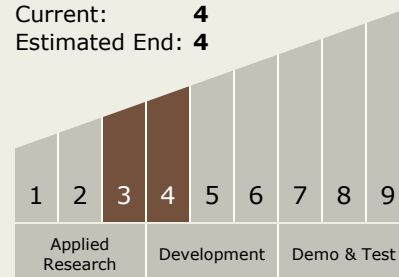
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Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.4 Microwave, Millimeter-, and Submillimeter-Waves

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System